INVITED ORAL PRESENTATION

Design of Ni based catalysts with tailored properties: investigation of the CO_2 reforming of CH_4

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Global warming is a critical issue that has become increasingly pressing in recent years due to the high levels of carbon dioxide (CO_2) emissions resulting, especially, from the use of fossil fuels. The dry reforming of methane (DRM) producing syngas (H_2/CO), that is a key mixture to produce synthetic fuels, may mitigate the environmental challenges associated with greenhouse gases emissions. However, DRM is an extremely endothermic reaction, accompanied by several side reactions, such as methane decomposition, Boudouard reaction and CO reduction, contributing to carbon deposit and leading to severe deactivation of the catalyst [1]. Therefore, there are only few industrial-scale plants currently using only DRM. Among used catalysts, Ni supported finds the largest application due to the relatively low cost and high availability. However, Ni catalysts suffer from sintering under high temperatures and coke deposition, both phenomena can be controlled improving the characteristics of the support (e.g., ensuring dispersion of metal particles, increasing basic properties and the availability of the surface oxygen species) [2,3]. In this scenario, the design of tailored catalysts and specific supports become crucial.
In recent studies has shown that the performance of Ni-based catalysts in DRM can be significantly improved by using promoters, optimizing synthesis conditions, and modifying the support materials [4-6]. The use of suitable support oxides and promoters can enhance the dispersion of the Ni particles, control carbon deposition, and improve the redox properties of the catalyst, leading to higher catalytic activity and selectivity towards syngas production [1-6]. These findings provide insights for the development of new efficient and stable catalysts for CO_2 conversion through dry reforming, which is a promising approach for addressing both energy and environmental challenges.
In this work advances in the design of Ni based catalysts for the CO_2 reforming of CH_4 will be presented.

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